

SATURDAY, JULY 24, 1880.

THE SOCIETY OF AMERICAN TAXIDERMISTS.

BY WM. T. HORNADAY.

It is high time that the art of taxidermy should receive a new impetus from some source, if it is ever to rise above the level of an undignified, and rather unattractive trade. It is by no means universally looked upon as a fine art, it is certainly not patronized as such, and, until it is developed to a far higher state of perfection than it is at present, we are by no means sure it deserves to be. At present most taxidermists are fiercely jealous of each other and outsiders, and guard their little knowledge as a miser hoards his gold; and yet not a single taxidermist in America earns a competence, and no other position when once lost in one place is so hard to obtain in another. Taxidermists are agreed upon one point, and only one, viz.: that their art is one requiring as much anatomical knowledge and executive skill as either painting or sculpture, while each man, with but few exceptions is firmly convinced past all argument that *his* work is equalled by few and surpassed by none.

At present, taxidermy is not a popular art; as a profession, it is remunerative to the select few only, and even to those in a very moderate degree. But such results are but merited, and for this taxidermists have themselves to thank. If painters and sculptors had always been as narrow-minded, jealous, and absurdly exclusive of their knowledge as we have ever been (with but few exceptions) their art would stand no higher to-day than ours. I have known of taxidermists, who, when visited by other members of the profession, would invariably stop working the moment the visitor appeared and remain idle during his entire stay even though their specimen *spoiled*. Such men must think they are the only taxidermists in the world.

A great artist of any other description is ever ready and anxious to *learn*, even from the meanest sources sometimes; but your taxidermist soon knows too much to be taught anything by anybody, and to offer him any advice, or make an unfavorable criticism is to insult him. As a rule he refuses to teach his art to anyone, save at most fabulous prices. As a result of all this, taxidermy is not a popular art and not a tithe of its capabilities have yet been developed. Taxidermists have never combined to build up their art; from the very foundation, there have been no exhibitions, no well directed competition, no intelligent verdict as to the merits of this man or that, no interchange of ideas, no general and hearty dissemination of knowledge bearing upon this subject. The knowledge of the art is confined to a few, and so is the patronage.

The Society of American Taxidermists, the first of the kind ever organized, has been formed for the

avowed purpose of developing the art of taxidermy, and elevating it to the position it should occupy beside the kindred arts of painting and sculpture. It has been formed not for the benefit of a few individuals, but with the higher, broader purpose of developing the possibilities of the art, and raising it to the level of a dignified and justly remunerative profession. Its members are practical, determined men who enter upon the work before them with all professional jealousy laid aside, and with the determination to work as one man. They propose to diffuse as widely as possible a correct knowledge of the methods employed in taxidermy, and by their work to create in the public a proper appreciation of their art as such. They believe that by combination, sharp but well regulated competition, and a few years of patient, earnest work and self improvement they will, in a measure, accomplish their object.

The Society has been started by the professional taxidermists in Prof. Ward's famous establishment at Rochester, N. Y., and already includes many well-known specialists in every branch of the art. It has received most cordial letters of encouragement and endorsement from such eminent scientists and patrons of taxidermy as Prof. Henry A. Ward, of Rochester, Prof. J. A. Allen, of Cambridge, Dr. Elliott Coues, of the Smithsonian Institution, and Dr. G. E. Manigault, of Charleston, S. C. Each of the above-mentioned gentlemen is an Honorary Member of the society.

The organization is steadily attracting candidates for membership from various parts of the United States, liberal minded professionals, and ambitious and enterprising amateurs who are only too glad of so fair an opportunity to follow up an attractive art.

The Society is to be national in all respects, and it is to be hoped it will yet wield an influence which will be felt in foreign countries. Indeed its members look forward to the day when there may be held under its auspices in this country a grand international exhibition of works in taxidermy.

The Society proposes to hold its first annual meeting and exhibition in the city of Rochester, on or about Dec. 20th of this year, at which a corps of carefully selected judges shall critically examine the objects in the exhibition and award the honors. Of course the judges will not be ordinary members of the society, and absolute fairness will be guaranteed. The objects entered for the exhibition will be divided into the following classes, which embrace work in every branch of the art:

A. TAXIDERMY PROPER.

First—Stuffed mammals, birds, reptiles and fishes, in groups.

Second—Single specimens.

Third—Heads. (Special attention is requested to the artistic arrangement of heads, especially those of small animals).

Fourth—Skins of all kinds.

Fifth—Crustaceans, in groups.

B. MISCELLANEOUS OBJECTS.

First—Animals grotesquely mounted.

Second—Ornamental articles, in which only portions of an animal are used, as fans, feather work, fire screens, rugs, footstools, etc.

C. ADJUNCTS TO TAXIDERMV.

Tools, eyes, materials, perches, leaves, rock-work, etc.

Already a large number of important objects are entered for exhibition, consisting chiefly of artistic groups, both large and small, and it is certain that there will be a fine display in class B, or household ornaments and decorations, most of which will be entirely new and original in design. A silver medal will be awarded to the finest single exhibit, a bronze medal to the best general exhibit, and a diploma of honor to the best exhibit in each of four natural classes, viz.: Mammals, birds, reptiles and fishes. A number of interesting papers and notes upon the various methods of taxidermy will be read at the general meeting and afterwards published in a volume as the proceedings of the society. From now until December each member will be busily engaged in putting forth all his skill and knowledge in the effort to win some of the honors offered for the highest excellence.

It is to be earnestly hoped that their vigorous and already successful movement will meet the hearty approval and co-operation of all American taxidermists, both amateur and professional, and that they will, by joining the society, and taking active part in the meetings and exhibitions, help to build up a powerful and influential organization, which is devoted to their best interests. The most unskillful amateurs are cordially welcomed as members, if they are but earnest in taking hold of the work in hand. It now remains to be seen how much liberality of mind, enthusiasm of purpose and ambitious enterprise will be awakened by this movement among American taxidermists.

DESCRIPTION OF SOME MONSTROSITIES OBSERVED IN NORTH AMERICAN COLEOPTERA.¹

BY HORACE F. JAYNE.

The accumulation of material in some of the larger collections of Coleoptera of our fauna has suggested that a description of the more marked monstrosities might be interesting, and aid at some future time in throwing light on points of development not yet understood. I have, therefore, in this paper, described and figured those monstrosities which M. Mocquers of Rouen, in his excellent work on Abnormal Coleoptera, calls "Monstrosities by Excess." Deformities by deficiency or incomplete development have not been considered as they do not seem of sufficient importance, and point only to accidents happening to the insects while in the larvæ or pupæ stage.

I desire to return my sincere thanks to Dr. Horn for the free use of his collection and library, for many suggestions and for kindly revising these pages; also to Dr. LeConte for the loan of specimens from his cabinet, and to Dr. Hagen for the use of specimens belonging to the Museum of Comparative Zoology at Cambridge.

¹A paper read before the Am. Ent. Soc., June, 1880.

CALOSOMA TRISTE, Lec.

Fig. 1 represents a monstrosity on the right antenna of a specimen of *Colosoma triste*, Lec. It consists in the sixth joint bearing two branches of five joints. Fig. 1a, shows the antenna greatly enlarged. The first three joints are normal; the third a little dilated at apex. The fourth is normal in length but is one-half broader at apex. When viewed from above it is distinctly pyriform. The fifth joint is also of normal length but twice the width of that of the left side and slightly broader at apex. The sixth joint is pentagonal in form, in its widest place as wide as long. The apex is obliquely truncate on its inner and outer angles, presenting two unequal faces for the insertion of the two branches. The inner or posterior facet is much smaller and from it arises that branch with the joints exactly resembling the normal antenna. The anterior or outer facet is larger and gives insertion to an anterior or outer branch of five joints; the first being short and thick the others similar to the corresponding normal joints but smaller.

The specimen is in Dr. Horn's Cabinet. Collected in California.

CYCHRUS ANGUSTICOLLIS, Fisch.

Fig. 2 represents the deformed left anterior leg of a specimen of *Cychnus angusticollis*. The femur is greatly dilated a little beyond the middle and gives off from its superior border a tubercle moderately long and blunt at tip. This may possibly indicate an attempt at the development of a second leg. The femur is then narrowed and at apex is a little larger than the apex of the normal joint. The existence of a cotyloid cavity shows the former presence, and accidental loss of the tibia.

In the Museum of Comparative Zoology at Cambridge.

METRIUS CONTRACTUS, Esch.

A monstrosity in the middle left leg of a specimen of *Metrius contractus* is shown in fig. 3. The femur bears two tibiæ; the inner one bearing two full sets of tarsal joints. The femur is normal. The outer tibia, which may be regarded as the normal one, arises from the extremity of the femur and is somewhat shorter, stouter, and more curved than the tibia of the middle right leg. The inner tibia arises from the posterior side of the femur a short distance within the tip and is articulated with it by a separate cotyloid cavity, the two cavities however are confluent as seen in fig. 3a. It is distinctly arcuate, dilated toward the apex which is obliquely truncate at each angle. From each facet thus formed arises a tarsal joint of normal length, almost contiguous at their bases, and somewhat stouter than the succeeding joints which are normal in form but shorter than those of a normal tarsus. There are four terminal spurs to this tibia, two placed external to the outer tarsus, two within the inner.

In Dr. Horn's Collection.

PASIMACHUS PUNCTULATUS, Hald.

A specimen of *Pasimachus punctulatus* has seven legs; the extra one arising from a trochanter placed between the normal trochanter and femur of the left

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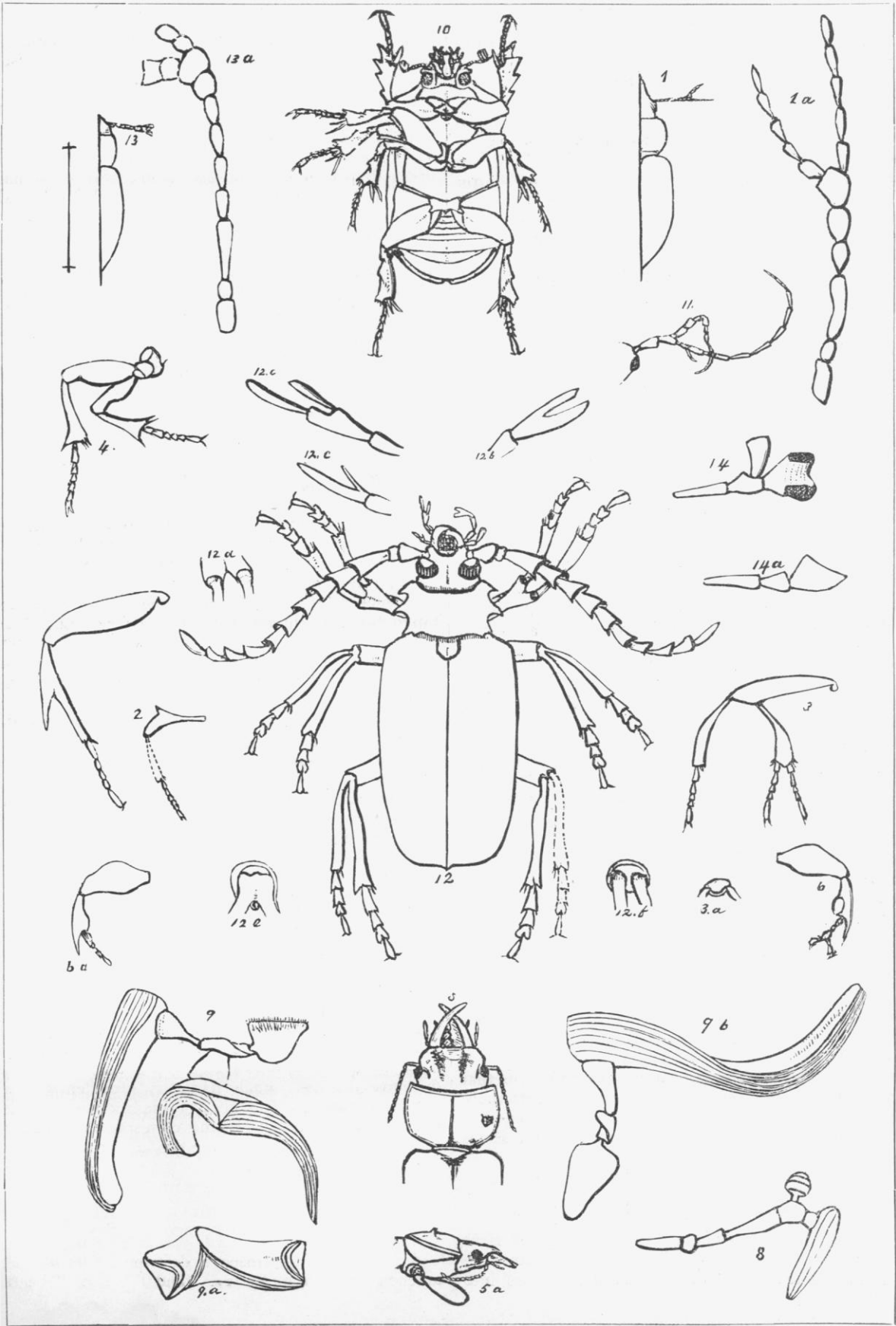
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A specimen of *Pasimachus punctulatus* has seven legs; the extra one arising from a trochanter placed between the normal trochanter and femur of the left



middle leg. Fig. 4 represents the anomaly as seen from below. The coxa and trochanter are like those of the right leg. On the inferior surface, between the trochanter and femur and embraced in front and behind by the latter, is inserted a second trochanter; triangular in form, about half as wide and one-third as long as the normal one. It gives origin to the extra femur, which is two thirds as long and about three-fourths as stout as the main thigh. The tibia of this extra femur is perfect except that it is one-fourth shorter than the other; its spurs and tarsal joints and the claws of the latter being all normal. This abnormal leg is less chitinous than the others.

In Dr. Horn's Collection.

SCARITES SUBSTRIATUS, Hald.

I have tried to represent in fig. 5a monstrosity on the right side of the dorsal surface of the prothorax in a specimen of the *Scarites substriatus*. It consists of a tubercle about a thirty-second of an inch long, projecting outward and slightly forward. It arises a thirty-second of an inch transversely from the middle of the right margin of the thorax. It is deeply cleft on the summit, almost transversely. Fig. 4a, represents it when viewed from the side.

Collected in Texas. In Dr. Horn's Cabinet.

DYSCHIRIUS GLOBULOSUS, Say.

The anomalous right anterior leg of a *Dyschirius globulosus* is shown in fig. 6. Fig. 5a, represents the normal right leg. The deformity consists in the third joint of the tarsus bearing two branches of two joints each. The inferior terminal spur of the tibia is wanting. The first two joints of the right tarsus are normal; the third a little longer, more clavate, and obliquely truncate on each side at tip for the articulation of the double set of joints which follow. The two anomalous branches arise on each side of the sharp apex thus formed, one directed to the left, the other to the right. The first joint on each branch is a shorter and stouter than a normal fourth joint; while the terminal or claw joint does not differ greatly in length. The claw joint of the inner or left branch bears a pair of normal claws, the outer claw joint is somewhat broader and bears two sets of claws curved from each other.

In Dr. LeConte's Cabinet.

CHLÆNIUS DIFFINIS, Chaud.

Fig. 7 represents a deformity in the left middle leg of a specimen of *Chlænium diffinis*. The tibia at a point a little below the middle bifurcates, the inner bifurcation continuing to normal length bears the tarsal joints. The outer is about two-thirds as long as the inner. It appears from its size and form that this branch bore a set of tarsal joints similar to those seen on the inner; and this opinion is strengthened by the fact that the end is somewhat ragged and seems to have been broken off.

In Dr. Horn's Cabinet.

LICHNANTHE VULPINA, Hentz.

A specimen of this insect has an anomalous right antenna as shown in fig. 8. The first three joints are normal. The fourth, fifth, and sixth are fused into

one joint twice as long as the third; the seventh appears to be connate with the first joint of the club. From the posterior outer border of the long fourth joint near the tip there arises a spherical club of three joints about the length of the third antennal joint. The first joint comprising the pedicle and base of the club, the second the centre, and the last the apex.

In Dr. Horn's Cabinet.

POLYPHYLLA DECEMLINEATA, Say.

Fig. 9 represents the right antenna of a specimen of *Polyphylla decemlineata* in which, in addition to the normal structure, the second joint bears a branch anteriorly, consisting of a single free joint which supports two clubs, placed transversely to the normal, of seven lamellæ each, united at their bases. The plane of the normal club is perpendicular to the plane of the abnormal, but in the figure the two are represented as in the same plane; the normal branch as seen from the outer side, the abnormal as seen from above. Fig. 9b, represents the left antenna. The basal joint of the right antenna is somewhat smaller and more inflated than that of the left. The second joint is twice as long as the corresponding one on the left antenna; the outer half of the anterior border being flattened for the insertion of the first joint of the abnormal branch, and its posterior border somewhat sinuate near the tip. The double club on the abnormal branch consists of two sets, of seven lamellæ each of unequal size, united at their bases at an angle of forty-five degrees, the outer scarcely longer than half the inner and more curved, while the inner is but little shorter than the club of the normal branch but more curved than it. The joint supporting these branches is obconical and much shorter than the second joint from which it arises. Fig. 9a, represents the double club as seen from below. The third joint of the normal or posterior branch is in form like that of the left antenna, but a fifth shorter. It bears a club of seven lamellæ, which is directed downward, and is about half as long as that of the left side, much narrower and feebly curved.

The insect is in Dr. LeConte's Cabinet.

STRATEGUS ANTÆUS, Fabr.

A specimen of this insect has the left middle leg triplicated. I have tried to represent this monstrosity in fig. 10. It may be regarded as made up of a normal leg with its trochanter entire. To the under surface of this normal femur are added two others, making together a pyramidal mass; free at their apices for about one-third their length. Those of the normal femur and the one nearest to it are closely placed, while the other diverges at an angle of about forty-five degrees. Each femur is provided with a tibia and tarsus. The tibia of the normal femur is not as greatly developed as the corresponding one on the right leg and those on the two abnormal femora are still less strongly marked.

In the Museum of Comparative Zoology at Cambridge.

TELEPHORUS ROTUNDICOLLIS, Say.

A specimen of this insect is deformed in the right antenna as shown in fig. 11. The third joint bears

from its anterior surface an extra branch of six joints. The first joint of this antenna is much stouter than the corresponding joint on the left side. The second about half as long as the first and as stout. The outer half of the anterior border is flattened to receive the first joint of the abnormal branch. From its end arises the regular branch of nine joints, all of which are normal except the first which gives off near the middle of its posterior border a slender spine-like process, half as long as the joint itself, curving outward and backward. The abnormal branch which is composed of six joints is directed forward and outward. The first three joints are flattened and very wide proportionately, the last three cylindrical. The first joint is about as long as the one which bears it and at its base about half as wide as long but considerably wider at tip. The next joint is a little narrower than the tip of the first. Its length about equals its width. The third is one-third narrower than the second and almost twice as long as wide. In the figure it is represented as folded upon itself. The fourth joint is somewhat longer than the third and half as wide, almost twice as long as the fifth which bears the sixth a long slender joint which curves inward and is as long as the fourth and fifth together.

PRIONUS CALIFORNICUS, Motsch.

Fig. 12 represents in a specimen of *Prionus californicus* one of the most remarkable monstrosities that has probably ever occurred among Coleoptera—remarkable not only for extent but also for symmetry. The left maxillary palpus bears two terminal joints. In the right maxillary and the left labial palpi the terminal joint is bifid. Each femur bears two tibiae furnished with tarsi and claws. The second joint of the left maxillary palpus appears to be composed of two joints closely connate, the anterior one much shorter than the other, each bearing a terminal joint of somewhat unequal lengths, as shown by fig. 12a. The terminal joint of the right maxillary palpus is deeply cleft at apex representing two joints connate at their basal halves; fig. 12b. The terminal joint of the left labial palpus gives off anteriorly from its base a second joint half as long and as stout as the other and connate with it; fig. 12c. The antennae are normal. The anterior femora are normal in length and in articulation with their coxae. They gradually widen from base to apex where they are more than twice as wide as a normal femur. Rhomboidal in section; the superior surface about one-third narrower than the inferior. The apices are dilated and deeply notched vertically, making two processes about as long as wide, each containing a normal cotyloid cavity with which the tibiae are articulated in a normal manner. Fig. 12d, shows the femur and articulations as seen at the end. Of the tibiae the anterior is somewhat shorter and about two-thirds as stout as the posterior, which is probably the normal one. The spurs, tarsi, and claws of both are similar. The middle femora are normal in length and form but about one-half stouter. The apices each contain one large cotyloid cavity. Into this, which is twice as wide as a normal one, is inserted a single broad condyle formed by coalescence of the condyles of the two tibiae is shown in fig. 12e. The

anterior of these is somewhat shorter and about two-thirds as stout as the posterior. Its tarsi are more slender and a little shorter. The articulation of the tibiae with the left posterior femur is identical with that of the middle femora; fig. 12e. The anterior of the two tibiae and its tarsus are about five-sixths the length of the posterior and one-half more slender. In the right posterior femur the articulation with the two tibiae differs from all the others. The femur itself is about equal in thickness to the left but is a trifle more dilated at apex. This is not notched as in the anterior femora, but truncate. Each tibia is inserted into a distinct cotyloid cavity separated by a considerable interval; fig. 12f. The anterior of the two has been unfortunately broken off about one-fourth of an inch from the femur. The structure of the under side presents no departure from the normal standard.

Collected by Mr. Morrison in Washington Territory.

ELEODES PILOSA, Horn.

In fig. 13 is shown a specimen of *Eleodes pilosa*, the right antenna of which is deformed; the ninth joint bearing on its end two branches of two joints each. Fig. 13a, represents the antenna enlarged. The first seven joints are normal. The eighth and ninth equal each other in length, being slightly shorter than the seventh. The eighth is as wide as long. The ninth at base is as wide as long; at the middle almost twice as wide. From the anterior part of the end arises a branch of two joints which are flattened, almost connate and a little more than half as wide as the ninth joint and as long as wide. The last joint is sinuate at tip. From the posterior part of the end of the ninth joint arises a branch also of two joints which equal in length those of the other branch but are more cylindrical and more nearly resembling normal terminal joints.

From Nevada. In Dr. Horn's Cabinet.

HELOPS SULCIPENNIS, Lec.

Fig. 14 represents an anomaly in the right maxillary palpus of a specimen of *Helops sulcipennis*. Fig. 14a, shows the normal palpus. The anomaly consists in the second joint bearing two terminal joints, one from the outer end of the anterior border and one from the tip. The first joint of this palpus is normal. The second nearly so excepting a dilation and flattening of the anterior border into which the terminal joint is inserted. The latter joint, which in the figure is represented as seen from below, is foreshortened as its plane is nearly perpendicular to the plane of the palpus proper. When viewed from the side it is precisely similar to the terminal joint in fig. 12a. The other joint which arises from the tip of the second is really made up of two joints soldered together at the bases of their broad surfaces. It is consequently twice the thickness of the other terminal joint and at its free edge deeply grooved indicating the union of two joints, and presenting that silky appearance common to the free edge of the normal joint. It is shown in the figure as seen partially from below, partially from the side. The parts shaded are intended to represent the edges of the two joints in one, the dotted part the deep groove.

In Dr. Horn's Cabinet.

SCIENCE:

A WEEKLY RECORD OF SCIENTIFIC PROGRESS.

JOHN MICHELS, Editor.

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To Correspondents.

All communications should be addressed to the Editor—Box 3838, P. O., New York—with name and address of writer, not necessarily for publication without consent.

Scientific papers and correspondence intended for publication, should be written *legibly* on one side only of the paper. Articles thus received will be returned when found unsuitable for the Journal.

Those engaged in Scientific Research are invited to make this Journal the medium of recording their work, and facilities will be extended to those desirous of publishing original communications possessing merit.

Proceedings of Scientific Societies will be recorded, but the abstracts furnished must be signed by the Secretaries.

Both questions and answers in "Notes and Queries" should be made as brief as possible; an answer appearing to demand an elaborate reply, may be written in the form of an article.

To Subscribers.

Terms of subscription for SCIENCE will be \$4 a year, payable in advance. Six months, \$2.50. Single copies 10 cents.

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To Advertisers.

Terms for advertising may be obtained at the office of Journal, 229 Broadway.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We direct the attention of our readers to the approaching meeting of the American Association for the Advancement of Science, which will be held this year at Boston, commencing at 10 o'clock on Wednesday morning, the 25th of August.

As it is generally believed that the Boston meeting will be the largest and most important hitherto held, we are completing arrangements with the Executive, by which abstracts of all papers read may be printed in "SCIENCE" contemporaneously with the meeting of the Association, together with a full report of the proceedings; we have reason to believe that such a course will be welcome to the members of the Association, and useful in many respects. In a later number we propose to give fuller particulars in regard to this

matter, and in the meantime would be glad to hear from those who will read papers at this meeting, particularly where illustrations are necessary, as by a little co-operation greater justice to the publication of such papers may be attained.

We may state for the convenience of non-members desirous of being admitted as members, that by paying the fees in advance (eight dollars), before the meeting, member's tickets will be sent, which will secure to new members and nominees the same privileges possessed by old members.

The attention of entomologists is directed to the annual meeting of the Entomological Club of the Association, which will be held at the rooms of the Boston Society of Natural History, on Tuesday, August 24th, at which all interested in entomology are invited to be present.

We notice by the prospectus that the suggestion made at Saratoga to form a sub-section devoted to Physiology and Anatomy will be carried out at Boston, and it is also probable that new sub-sections in Geology and Physical Geography will be formed.

We trust that all interested in science who can attend this meeting of the Association will not fail to be present, and that many new members will enroll themselves and take part in the proceedings.

Independent of the interest attached to the meeting of the Association several excursions have been planned, which will add greatly to the pleasure of those present, and cannot fail to make the trip to Boston one which will be long after recalled by many agreeable remembrances.

A NEW sulphate of alumina (sesquibasic sulphate of alumina) has been prepared by M. Marguerite. One method is by decomposition of alum of ammonia through heat. When the alum is heated to a red heat carefully, there remains after the operation anhydrous sulphate of alumina; if the calcination have been pushed further, there is partial decomposition. The matter held by the water gives a liquor which, concentrated, deposits crystals of the sesquibasate. Ordinary sulphate of alumina, dried and colored gently, gives the same reaction, and the new sulphate can also be got by the wet process. (See *Comptes Rendus*).

A CURIOUS geological effect has recently occurred in Sicily. On the morning of the 20th May the half of an old château at the seaside, between Catania and Acireale, fell in consequence of alteration of an enormous volcanic rock which had supported it. This rock was about 50m. high and 80m. in circumference; its form nearly cylindrical. It was placed on an older layer of lava, which forms a promontory. The rock is in such a state of disintegration, that pieces can easily be detached with the hand. The effect seems due to superoxidation of the iron, which it contains in abundance, and to the action of carbonic acid on the calcareous matter in it. The château in question is a very old one, but its walls were entire, and one might visit it in all its parts. Half an hour before the fall, a family of tourists had taken up residence in it, with a view to visiting the Cyclops islands, which rise a short way off.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

TWENTY-NINTH MEETING.

IN conformity with the vote at the last meeting, the Twenty-ninth meeting of the Association will be held at Boston, Mass., commencing at ten o'clock, A. M., on Wednesday the 25th of August, 1880. A large and efficient Local Committee has been formed and through its several subcommittees is engaged in perfecting the local arrangements for the meeting, which will be announced by special circular as early as possible. It is only necessary to state here that the members of the committee are desirous of doing everything in their power to promote the objects of the Association. As it is generally believed that the Boston meeting will be the largest and probably the most important hitherto held by the Association, every effort will be made by the officers of the Association residing in Boston and vicinity, co-operating with the Local Committee, to prepare a satisfactory general programme for the week (subject to the approval of the Standing Committee) in advance of the meeting, the substance of which will be given in the circular of the Local Committee. To this end several votes were passed at the last meeting of the Standing Committee in Saratoga, and the attention of members is particularly directed to the new clause in relation to titles of papers; also to the probable necessity of forming additional subsections.

The Headquarters of the Association will be at the Massachusetts Institute of Technology, where members will register as soon as possible after arrival. The Hotel Vendôme, corner of Commonwealth Ave. and Dartmouth St., has been selected for Hotel Headquarters.

The offices of the Local Committee and of the Permanent Secretary will be at the Institute of Technology. The General Sessions will be held in Huntington Hall in the same building. The several Sections, Subsections and Committees will have their places of meeting designated on the programme for Wednesday.

The circular which will soon be issued by the Local Committee will contain full information in relation to Hotels and Boarding houses in Boston and vicinity with which special arrangements have been made.

The *Permanent Subsection of Chemistry* will be continued at Boston under the chairmanship of Professor John M. Ordway, of Boston.

The *Permanent Subsection of Microscopy* will be presided over by Prof. S. A. Lattimore, of Rochester, and the active co-operation of microscopists is requested. Arrangements have been made for the proper care of instruments, etc.

The *Permanent Subsection of Anthropology* will be under the chairmanship of Prof. J. W. Powell, of Washington. For special circular and information in relation to this subsection, address Judge J. G. Henderson, *Secretary*, Winchester, Ill.

The attention of entomologists is directed to the annual meeting of the Entomological Club of the Associa-

tion, which will be held at the rooms of the Boston Society of Natural History at two o'clock, on Tuesday August 24, at which all interested are invited to be present. Mr. S. H. Scudder, of Cambridge, President; Mr. B. P. Mann, of Cambridge, Secretary of the Club. (A special circular concerning this meeting will be sent to all requesting it.)

At the Saratoga meeting the desirability of forming a new subsection in the Association, which should be devoted to *Physiology* and *Anatomy*, was discussed with the special object of inducing members interested in Human Physiology to bring their papers before the Association and also of obtaining the active co-operation of Physicians and Surgeons in the work of the Association. The interest taken in the proposition at Saratoga was such that a permanent organization of the new subsection is expected at the Boston meeting. It will also, probably, be found necessary to form a subsection of Geology and Physical Geography at the Boston meeting.

Several excursions will be arranged for by the Local Committee. Among others, one is planned for Salem and another down the Harbor. On Thursday, the Association will probably hold a morning session in Cambridge, after which visits will be made to the various departments and Museums of the University, followed by a reception at the Botanic Garden and the Observatory in the evening.

All communications relating to the local arrangements for the Boston meeting must be made to the *Local Secretaries* at Boston, while all matters relating to membership and to the presentation of papers will be attended to by the *Permanent Secretary*.

Attention is specially requested to the following articles of the Constitution of the Association.

ART. 3. Any person may become a Member of the Association upon recommendation in writing by two members or fellows, nomination by the Standing Committee, and election by a majority of the members and fellows present in general session.

(Blank forms for recommendation to membership will be furnished on application to the Permanent and Local Secretaries, and, until the day of the meeting, they will receive the recommendations for the General Secretary; after the meeting has begun, recommendations must be given to the General Secretary.)

ART. 4. Fellows shall be nominated by the Standing Committee from such of the members as are professionally engaged in science, or have by their labors aided in advancing science. The election of fellows shall be by ballot and a majority vote of the members and fellows present in general session.

ART. 5. Any person paying to the Association the sum of one thousand dollars shall be classed as a Patron, and shall be entitled to all the privileges of a member and to all its publications.

ART. 7. The name of any member or fellow two years in arrears for annual dues shall be erased from the list of the Association, provided that two notices of indebtedness at an interval of at least three months, shall have been given; and no such person shall be restored until he has paid his arrearages or has been reelected.

ART. 33. The admission fee for members shall be five dollars in addition to the annual assessment. On the election of any member as a fellow an additional fee of two dollars shall be paid.

ART. 34. The annual assessment for members and fellows shall be three dollars.

ART. 35. Any member or fellow who shall pay the sum of fifty dollars to the Association, at any one time, shall become a Life Member, and as such shall be exempt from all further assessments, and shall be entitled to the Proceedings of the Association. All money thus received shall be invested as a permanent fund, the income of which shall be used only to assist in original research unless otherwise directed by unanimous vote of the Standing Committee.

ART. 36. All admission fees and assessments must be paid to the Permanent Secretary, who shall give proper receipts for the same.

ART. 27. All members and fellows must forward to the Permanent Secretary, as early as possible, and when practicable before the convening of the Association, full titles of all the papers which they propose to present during the meeting, with a statement of the time that each will occupy in delivery, and also such abstracts of their contents as will give a general idea of their nature; and no title shall be referred by the Standing Committee to the Sectional Committee until an abstract of the paper or the paper itself has been received.

(Blank forms for giving the titles and abstracts of papers will be furnished by the Permanent Secretary on application. The Standing Committee particularly request, in order to facilitate the arrangement of the programme, that the titles and abstracts should be forwarded so as to reach the Permanent Secretary before August ninth. At the Saratoga meeting the Permanent Secretary was instructed *not to enter*, on the list of papers to be presented, any titles of papers until an abstract of the paper, or the paper itself, was received.)

Notice of errors in the printed list of Members of the Association, of change of address, and information respecting the decease of Members, should be sent to the Permanent Secretary in order that due notice may be taken of the same in the next volume of "Proceedings." It is particularly requested that the Permanent Secretary be notified at once of any errors in the names and addresses that will be given in the list in the Saratoga volume, as a revised edition of the list will be printed for circulation at the Boston meeting.

The Saratoga volume (vol. 28) will soon be distributed by mail to every member who has paid the assessment for the Saratoga meeting.

The volumes of the Proceedings of the Association (28 in number) can be obtained from the Permanent Secretary, at the price of \$1.50 a volume; or any member wishing for ten or more volumes, in order to complete a set, may obtain them at \$1.00 a volume. The volumes may be had bound in cloth for the extra price of fifty cents each, or in one-half Turkey morocco for the extra price of \$1.00 each. Uniform cloth covers for the volumes will be furnished by mail at thirty cents each, or, by express or at the meetings for twenty-five cents each. Copies of Volumes 2 and 26 will be received in exchange for other volumes or will be purchased at \$1.00 each.

The Memoir on Fossil Butterflies, by Mr. S. H. Scudder, published by the donation of Mrs. Elizabeth Thompson, 4to, 1875, will be furnished at \$2.00 a copy. The Transactions of the Association of Geologists and Naturalists, 1 vol. 8vo, 1843, bound in cloth, can be obtained at \$3.00 a copy.

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The address of the PERMANENT SECRETARY, F. W. Putnam, Esq., will be *Salem, Mass., until August 1st*; after that time, and until the meeting has adjourned, his office will be at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY, *Boston, Mass.*

ON "LIMNOCODIUM VICTORIA," A HYDROID MEDUSA OF FRESH WATER.

A short time since I received from Mr. Sowerby, Secretary of the Royal Botanical Society, a letter informing me of the occurrence of certain Medusoid organizations in the warm-water tank devoted to the cultivation of the *Victoria regia* in the Gardens of the Society. The letter contained a request that I should examine the animals with a view to their determination; Mr. Sowerby accompanied it with rough sketches, and offered to place specimens at my disposal.

The discovery of true freshwater Medusæ was so startling a fact that I lost no time in calling on Mr. Sowerby, with whom I visited the tank, and carried away such specimens as were needed for examination.

The water in the tank had then a temperature of 86° F., and was literally swarming with little Medusæ, the largest of which measured nearly half an inch in transverse diameter. They were very energetic in their movements, swimming with the characteristic systole and diastole of their umbrella, and apparently in the very conditions which contribute most completely to their well being.

As it now became evident that the Medusa belonged to a generic form hitherto undescribed, I prepared for the Linnean Society a paper containing the results of my examination, and assigning to the new Medusa the name of *Limnocoedium victoria* (*λίμνη*, a pond, and *κώδων*, a bell). This was received and recorded by the secretaries on June 14, and read at the next meeting, on the 17th.¹

The umbrella varies much in form with its state of contraction, passing from a somewhat conical shape with depressed summit through figures more or less hemispherical to that of a shallow cup or even of a nearly flat disk. Its outer surface is covered by an epithelium composed of flattened hexagonal cells with distinct and brilliant nucleus. The manubrium is large; it commences with a quadrate base, and when extended projects beyond the margin of the umbrella. The mouth is destitute of tentacles, but is divided into four lips, which are everted and plicated. The endoderm of the manubrium is thrown into four strongly-marked longitudinal plicated ridges.

The radial canals are four in number, they originate each in an angle of the quadrate base of the manubrium, and open distally into a wide circular canal. Each radial canal is accompanied by longitudinal muscular fibres, which spread out on each side at the junction of the radial with the circular canal.

The velum is of moderate width, and the extreme margin of the umbrella is thickened and festooned, and loaded with brownish-yellow pigment cells.

The attachment of the tentacles is peculiar. Instead of being free continuations of the umbrella margin, they are given off from the outer surface of the umbrella at points a little above the margin. From each of these points, however, a ridge may be traced centrifugally as far as the thickened umbrella margin; this is caused by the proximate portion of the tentacle being here adnate to the outer surface of the umbrella. It holds exactly the position of the "mantelspangen" or *peronia*, so well developed in the whole of the Narcomedusæ of Haeckel, and occurring also in some genera of his Trachomedusæ. Its structure, however, differs from that of the true *peronia*, which are merely lines of thread cells marking the path travelled over by the tentacle as the insertion of this moved in the course of metamorphosis from the margin of the umbrella to a point at

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The number of the tentacles is very large in adult specimens. The four tentacles which correspond to the directions of the four radial canals, or the perradial tentacles, are the longest and thickest. The quadrant which intervenes between every two of these carries, at nearly the same height above the margin, about thirteen shorter and thinner tentacles, while between every two of these three to five much smaller tentacles are given off from points nearer to the margin, and at two or three levels, but without any absolute regularity; indeed, in the older examples all regularity, except in the primary or perradial tentacles, seems lost, and the law of their sequence ceases to be apparent.

I could find no indication of a cavity in the tentacles; but they do not present the peculiar cylindrical chord-like endodermal axis formed by a series of large, clear, thick-walled cells which is so characteristic of the solid tentacles in the *Trachomedusæ* and *Narcomedusæ*. From the solid tentacles of these orders they differ also in their great extensibility, the four perradial tentacles admitting of extension in the form of long, greatly-attenuated filaments to many times the height of the vertical axis of the umbrella, even when this height is at its maximum; and being again capable of assuming by contraction the form of short thick clubs. Indeed, instead of presenting the comparatively rigid and imperfectly contractile character which prevails among the *Trachomedusæ* and the *Narcomedusæ*, they possess as great a power of extension and contraction as may be found in the tentacles of many *Leptomedusæ* (*Thaumantidæ*, &c.) These four perradial tentacles contract independently of the others, and seem to form a different system. All the tentacles are armed along their length with minute thread cells, which are set in close, somewhat spirally arranged warts.

The lithocysts or marginal vesicles are, in adult specimens, about 128 in number. They are situated near the umbrellar margin of the velum, between the bases of the tentacles, and are grouped somewhat irregularly, so that their number has no close relation with that of the tentacles. They consist of a highly refringent spherical body, on which may be usually seen one or more small nucleus-like corpuscles, the whole surrounded by a delicate transparent and structureless capsule. This capsule is very remarkable, for instead of presenting the usual spherical form, it is of elongated piriform shape. In its larger end is lodged the spherical refringent body, and it thence becomes attenuated, forming a long tubular tail-like extension which is continued into the velum, in which it runs transversely towards its free margin, and there, after usually becoming more or less convoluted, terminates in a blind extremity.

The marginal nerve-ring can be traced running round the whole margin of the umbrella, and in close relation with the otolitic cells. Ocelli are not present.

The generative sacs are borne on the radiating canals, into which they open at a short distance beyond the exit of these from the base of the manubrium. They are of an oval form, and from their point of attachment to the radial canal hang down free into the cavity of the umbrella. Some of the specimens examined contained nearly mature ova, which, under compression, were forced from the sac through the radial canal into the cavity of the stomach.

While some of the characters described above point to an affinity with both the *Trachomedusæ* and *Narcomedusæ*, this affinity ceases to show itself in the very important morphological element afforded by the marginal bodies. In both *Trachomedusæ* and *Narcomedusæ* the marginal bodies belong to the tentacular system; they are metamorphosed tentacles, and their otolite cells are endodermal, while in the *Leptomedusæ*, the only other order of craspedotal *Medusæ* in which marginal vesicles occur, these bodies are genetically derived from the velum. Now in *Limnocoedium* the marginal vesicles seem to be as truly velar as in the *Leptomedusæ*. They occur on the lower or abumbral side of the velum, close to its insertion into the umbrella, and the tubular extension of their capsule runs along this side to the free margin of the velum, while

the delicate epithelium of the abumbral side passes over them as in the *Leptomedusæ*. It is true that this point cannot be regarded as settled until an opportunity of tracing the development is afforded; but in very young specimens which I examined I found nothing opposed to the view that the marginal vesicles were derived, like those of the *Leptomedusæ*, from the velum.

Important points still remain to be cleared up regarding the development of *Limnocoedium* and the determination of the question whether the *Medusa* be derived from the egg directly or only through the intervention of a hydranlid trophosome. I have arranged, with Mr. Sowerby, some methods of observation by which I hope to obtain data for determination of these points.

If this be the case *Limnocoedium* will hold a position intermediate between the *Leptomedusæ* and the *Trachomedusæ*; but as the greatest systematic importance must be attached to the structure and origin of the marginal vesicles, its affinity with the *Leptomedusæ* must be regarded as the closer of the two.

GEO. J. ALLMAN.

THE ELECTRIC LAMPS OF M. TCHIKOLEFF.

M. Tchikoleff, the head of the electric lighting department of the Russian artillery, has addressed to *La Lumière Electrique* a communication, of which the following is a translation, in which he claims that the application of derived currents which has been successfully adopted with the lamps of MM. Lontin and Siemens, was employed by him as far back as the year 1871.

"Having experimented for a lengthened period with the Foucault and Serrin regulator lamps, which were considered to be the best at the period when I took up the question, I was able to observe in them the following defects:

1. Several lamps, arranged in series or in multiple arc in a circuit, would not continue to work.
2. These lamps could be worked only by very powerful currents, whereas with a lamp regulated by hand the voltaic arc could be obtained with weaker currents, giving of course a less intense light.
3. They worked with regularity only when the current was constant, or varied within very restricted limits.

I traced the cause of these defects to the fact that the working of the regulating mechanism was based upon a kind of equilibrium between the attractive force of an electro-magnet and the counteracting force of a spring. Such a system does not regulate the distance between the charcoal points, but only the general force of the current in the circuit. Now under these circumstances it is possible that, when two or more lamps are placed in series in a circuit, one of them may have its carbons in contact, whilst the carbons of the other lamp or lamps are at a greater or less distance apart, without the equilibrium between the electro-magnets and the counteracting springs being disturbed.

Now it was to obviate this defect that I endeavored to devise an arrangement which, whilst allowing each lamp placed in a circuit to be independent of the general intensity of the current and its variations, would enable it to maintain constant the resistance of its own voltaic arc, and this arrangement appeared to me obtainable by applying to the regulator lamps the principle of the *differential action of derived currents*.

It was in 1869 that I made the first experiment on the foregoing arrangement with a regulator lamp of M. Foucault, the counteracting spring of which I replaced by a supplementary electro-magnet traversed by a very weak derivation of the current, parallel to the voltaic arc. This electro-magnet was wound with a wire of high resistance, and the current producing the voltaic arc passed through the other electro-magnet. The armatures of these electro-magnets were placed at the two extremities of a rocking-lever, carrying at its centre of oscillation an arm which controlled the mechanism for increasing or diminishing the distance between the carbons; and the rocking-lever was in equilibrium when the voltaic arc possessed its normal resistance.

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Now it was to obviate this defect that I endeavored to devise an arrangement which, whilst allowing each lamp placed in a circuit to be independent of the general intensity of the current and its variations, would enable it to maintain constant the resistance of its own voltaic arc, and this arrangement appeared to me obtainable by applying to the regulator lamps the principle of the *differential action of derived currents*.

It was in 1869 that I made the first experiment on the foregoing arrangement with a regulator lamp of M. Foucault, the counteracting spring of which I replaced by a supplementary electro-magnet traversed by a very weak derivation of the current, parallel to the voltaic arc. This electro-magnet was wound with a wire of high resistance, and the current producing the voltaic arc passed through the other electro-magnet. The armatures of these electro-magnets were placed at the two extremities of a rocking-lever, carrying at its centre of oscillation an arm which controlled the mechanism for increasing or diminishing the distance between the carbons; and the rocking-lever was in equilibrium when the voltaic arc possessed its normal resistance.

It is easy to understand that, with this arrangement, as the resistance of the arc becomes greater, the strength of the electro-magnet through which the current passes decreases, whilst the other electro-magnet becomes more powerful; so that the arm no longer remains in its vertical position, and by its inclination influences the mechanism which brings the carbons closer together. The contrary effect is of course produced when the inverse action occurs. An arrangement which, like the one in question, maintains constant the resistance of the arc evidently does not exert any effect upon the general intensity of the current in the circuit; for the variations of this intensity, outside of the lamp, exert always the same effect upon the two electro-magnets which control the latter.* The experiment with the Foucault lamp gave such good results that I decided to undertake the construction of a new lamp as free as possible from the defects inherent to the Foucault regulator, and to those based upon the same principle.

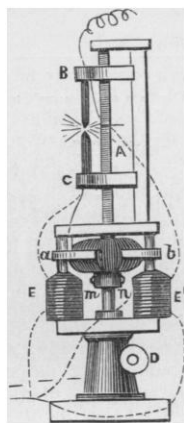


FIG. 1.

After some carefully made experiments with lamps having automatic regulation, and others regulated by hand, I ascertained that the latter would give a constant light with a much less number of battery cells than was requisite with the former. Thus with hand regulators I could obtain satisfactory results with 24 or even 20 Bunsen elements, whilst with the Foucault and Serrin regulators it was necessary to employ at least 40. The cause of this in the first place is that, in these regulating lamps the movements communicated to the carbons are always too sudden (*prompte*) for comparatively weak currents, and, in the second place, that these movements are constant instead of being proportionate to the intensity of the current passing by the voltaic arc. From this I naturally came to the conclusion that, in order to obtain a lamp suitable for practical working, it was necessary to apply the following three principles, which I consider as fundamental:

1. To maintain constant the resistance of the voltaic arc we should not employ a constant mechanical force such as that of a spring, but a weak derivation from the main current, parallel to the voltaic arc.
2. To obtain by means of a special derivation from the main current the movements augmenting or diminishing the distance between the carbons, in order that the rapidity of these movements may be proportionate to the intensity of the current producing the voltaic arc.
3. To make arrangements such that this rapidity of the movements communicated to the carbons should, at certain periods, be proportionate to the variations in their distance; that is to say to arrange the apparatus so that, in the case where the carbons have to be moved towards each other through an appreciable space, the movement communicated to them may be more rapid than when they have to be moved through a very short distance.

In 1871 I had constructed a lamp which fulfilled the two first of these principles, and which was brought before the Moscow Society of naturalists. In this system I employed

*This is somewhat obscure; what is meant, perhaps, is that the sum of the currents traversing the two magnets is, with the adjustments adopted, a constant value.—ED. E.

as motor a small electro-magnetic machine of Froment, worked by a derivation from the principal current passing by the carbons; and above this electro-motor, the axis of which was vertical, were placed the two electro-magnets of the differential system above referred to. An armature common to both and suspended between their poles like a pendulum, reacted upon a double system of gearing, the axis of which, furnished with two angle-wheels of unequal diameter, would present to the electro-motor one or the other of these wheels according as one or the other of the two electro-magnets was the more energetic. As the wheels in question corresponded to two opposite points of the driving wheel, the movements produced were in opposite directions and could increase or diminish the distance between the carbons with a rapidity greater or less according to the intensity of the current, since the working of the motor was dependent upon this intensity. The drawing of this lamp has been in the polytechnic museum of Moscow since the commencement of the year 1873.

At the end of 1873, M. Jablochkoff, who at that period had a mechanical workshop at Moscow, being convinced of the superiority of the systems of constructing lamps on the derived current principle, made in his workshop a lamp on this principle. I shall not refer to the experiments with this lamp, which gave full satisfaction to several persons. For my own part, I was but partially satisfied, on account of its complication, and because it did not fulfil the third of the fundamental principles I had laid down.

In 1874, I arranged a new lamp, the design of which I brought before the physical section of the Moscow Society of Naturalists, and which is represented by Fig. 1.

E E' are electro-magnets disposed like those on the other systems and having poles, *a b*, spread out in circular form as in the Gramme machine. K is a Gramme or Siemens ring, the rotary motion of which causes the carbons to move through the intermediary of a double-thread screw, A, and two nuts, B C, which carry the carbons. Lastly, D is a regulating screw, for the purpose of raising or lowering the luminous focus.

The current passes from the positive pole of the generator to the negative pole by three derivations, one of which includes the arc and traverses the ring by means of the contact-pieces *m n*; whilst a second, also including the arc, excites the electro-magnet E (or both electro-magnets in a given direction); and a third which, without passing by the arc, influences the high resistance magnet E' (or both magnets in contrary directions), so that the action of this magnet upon the ring shall be in a reverse direction to that of E.

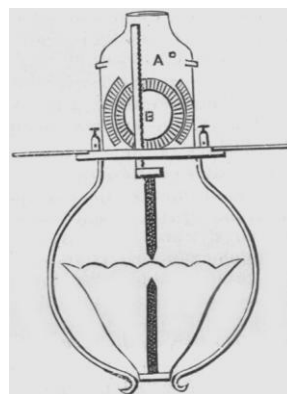


FIG. 2.

In consequence of this arrangement the action of the electro-magnets upon the ring K is almost *nil* when the arc possesses its normal resistance; but when the resistance of the arc augments the action of the electro-magnet, E becomes weakened, allowing E' to preponderate, and the ring K will rotate so as to bring the carbons into closer proximity. The contrary effect will, of course, be produced if the resistance of the arc should diminish.

Experience has shown that with such a lamp it is possible to obtain, with regularity and safety, a good electric light with twenty-four Bunsen cells, and at first with even twenty cells. Some of these lamps have been in use in the Russian artillery since 1877. This lamp may also be constructed on the principle of the Wheatstone balance.

The form of my lamp intended for public lighting is represented by Fig. 2. The rod A, with the upper carbon-holder works by the effect of its own weight. When the current traverses the lamp the distance between the two carbons is maintained by the aid of helical coils, but these coils and the toothed wheel which controls the movements are worked, as in the former case, on the principal of derivations. When the current is interrupted, the carbons come into contact by the effect of the weight of the rod A.

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I am convinced that the problem of the divisibility of the electric light by means of lamps having a voltaic arc can be solved only with the lamps based on the principle of the derivation of the current, which I discovered prior to Messrs. Lontin and Siemens.

Lamps with movable carbons offering a certain resistance between their polar extremities are moreover far preferable, from the point of view of divisibility, to lamps with fixed carbons (with carbons at a fixed distance?) which may offer great variations in the resistance of the arc, in consequence of impurities, the action of the wind, &c. These variations may in fact be greatly reduced in the former description of lamp, and it is not necessary with them to employ currents of such high tension or, if such currents be employed, additional lamps may be inserted in the circuit.

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To the Secretary of the Royal Society.

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THE "D-LINES" SPECTRA.—ARE THEY DUE TO WATER?

BY LIEUT.-COLONEL W. A. ROSS, late R. A.

In the year 1834, Mr. Fox Talbot, F. R. S., attributed the all but omnipresent rays affording the above-named spectra to water, on account of its universality; but the celebrated experiment of Kirchhoff has, since then, reversed that opinion, and bestowed the power of emitting orange rays upon sodium alone.

Is it not more reasonable, however, to suppose that sodium has more attraction for water than any other substance, than to imagine sodium contained in every possible substance, from the eternally-burning Sun himself, down to every particle of our atmosphere?

A man need not be a chemist, or pyrologist, to observe that, if he holds in platinum tongs a fragment of marble, or artificial carbonate of lime, or magnesia, before the blow-pipe, a strong orange flame affording "D-lines" spectra is emitted by the fragment, *only so long as it is imperfectly calcined*, or, in other words, has lost its carbonic acid gas. When calcination is complete, it begins to glow brightly, and emits no colored "flame" at all. Let us call this orange flame (a) in this case. According to modern chemical theories (a) can only be one of two things; carbonic acid gas or sodium. It cannot be carbonic acid, which so far from being combustible, is used to "put out" flame. It can be proved not to be sodium by making it impinge upon a bead of pure transparent boric acid, in which it causes, after a time, *opalescence*. This opalescence is removed by the similar impingement upon the bead of an indubitable sodium orange flame. Reasonable chemists, therefore, will not be inclined to contradict Euclid that the same cause producing precisely opposite effects is a *reductio ad absurdum*. Moreover, for the supposed sodium to have been with the marble, and not with the marble after calcination—"hic et ubique," like the ghost of Hamlet's papa—is another absurdity, which no modern chemist would require us to believe, although some are very exacting if not always exact. May I hope that most chemists will be now inclined to admit, first, that (a) can be due neither to sodium nor to carbonic acid; and secondly, that it must, therefore, be due to something else; and this is the very impression that occurred to me after thinking profoundly over the matter for several years.

Indeed, I suggested to Mr. Hennessy, who was engaged in making atmospheric observations at Mussooree, in India, with a spectroscope belonging to the Royal Society—and who was elected an F.R.S. for his pains—that the "D-lines" were due to water, not sodium, so long ago as 1871, and he was very much struck by the suggestion.

The methods I adopted to prove the truth (or improbability) of the suspicion which thus arose in my mind were as follows:

1.—The whole of (a) in a weighed fragment of pure marble was obtained by fusing it carefully before the blow-pipe in a transparent bead of boric acid, when the carbonic acid gas, which we may call (b), escaped in bubbles with great effervescence, (a) remaining behind as opalescence, and the lime (c) combining with a portion of the boric acid to form a ball contained in the bead—let us call the bead (d). I found the weight of the lime borate ball (c a) bore the same relative proportion to that of the marble (a b c) whether the latter had been previously calcined or not, so that the opalescence in (d) could not possibly have been part of (c) while (b) escaped in bubbles; therefore the opalescence must have been due to (a) or—

$$(a\ b\ c) + 2\ (d) - (b) = \left\{ \begin{array}{l} \text{(ball)} \\ \text{(c d)} \end{array} \right\} + \left\{ \begin{array}{l} \text{(hydrated boric acid)} \\ \text{(a d)} \end{array} \right\}$$

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2.—Observing that platinum in considerable bulk also produces (a) in a ratio increasing with the decrease of temperature down to a dull red heat, I fused an ounce of crystallised boric acid in an open platinum dish at red

heat, and obtained a new kind of boric acid, which turns brown with a strong *resinous smell*, on being ignited, like that of burning sealing-wax, affords a slightly-oranged "flame"—for the green pyrochrome of the boric acid overpowers that of (a).—and forms an opalescent bead, which reacts, as I believe, with much greater acidity before the blowpipe than ordinary boric acid does.

This I call *platinised* or *hydrated boric acid*, and shall be happy to show it to any chemist who may consider the matter to be sufficiently interesting.—*English Mechanic*.

AN IMPORTANT DISCOVERY.

A discovery in chemistry has just been published, which bids fair to influence agriculture in a manner that may be well described as revolutionary. It must soon compel the attention of farmers and manufacturers of artificial manures everywhere. The essential part which ammonia plays in vegetation need not here be dwelt upon, and no one will question the desirability of securing it cheaply and in quantity. The importance of the recent feat of Messrs. Rickman & Thompson, of England, disclosing a plan by which ammonium sulphate can be made and sold with profit at two cents a pound, will not, therefore, be liable to be over-estimated. The following account of the process is taken from the *Chemical News*:

Within the last twenty years the manufacture of ammonia synthetically has been several times attempted, and though in every attempt it is probable that ammonia has been made, it has never been produced on a commercial scale. In all these attempts the process has been to combine the nitrogen and hydrogen directly at a low temperature, and receive the ammonia in solution in water, or by substitution, first forming a cyanide at a higher heat, and then indirectly producing ammonia by the decomposition of the cyanide, the result in both cases being ammonia in solution with water. Rickman & Thompson's procedure is altogether different, they produce ammonium chloride direct, either in dry powder or in solution, and this by the simplest and most inexpensive means. Instead of employing retorts, as in all other places, they merely use a closed brick furnace, the ash-pan of which regulates the supply of air, and they cause the vapor of water to be produced by the waste heat of the furnace itself. With the exception of about a bushel of coke for starting the furnace, the deoxidizing material and only fuel used is coal-dust. The great difficulty in making ammonia from the nascent hydrogen of water and the nitrogen of the air is the restricted limits of temperature between generation and decomposition, it being necessary that carbon, however used, should be at a full red heat to decompose the vapor of water, and at a bright-red heat to decompose ammonia. Now, ammonium chloride under the same conditions is simply volatilized and not decomposed. As chloride of sodium or of calcium is decomposed at a full red heat in presence of nascent ammonia, therefore one of these chlorides is mixed with the coal that ammonium chloride may be formed; so that if by chance the heat should be raised to a bright red, no loss will be sustained—the ammonium chloride is simply volatilized. By these means a greater range of working temperature is obtained. At the present time, with the consumption of from 20 to 28 lbs. of coal-dust and salt mixed, from two or three lbs. of ammonium chloride is formed.

A NEW AUDIPHONE.—Further experiments on the timbre of musical instruments as rendered by the audiphone have led me to the selection of the following as a distinct improvement on the birchwood veneer, both for musical purposes and also for ordinary conversation. It has the same advantage as my previous form in not requiring to be held by the hand, it costs nothing, and requires no making. Take a sheet of stiff brown paper about 11 x 15 inches, the paper being such as is ordinarily used for making up heavy parcels. Put the ends together, the middle forming a loop, and hold the ends between the teeth. The paper must be pretty stiff, as the loop must stand out round and full, and of course the paper must be without folds or creases.

THOMAS FLETCHER.

THE "D-LINES" SPECTRA.—ARE THEY DUE TO WATER?

BY LIEUT.-COLONEL W. A. ROSS, late R. A.

In the year 1834, Mr. Fox Talbot, F. R. S., attributed the all but omnipresent rays affording the above-named spectra to water, on account of its universality; but the celebrated experiment of Kirchhoff has, since then, reversed that opinion, and bestowed the power of emitting orange rays upon sodium alone.

Is it not more reasonable, however, to suppose that sodium has more attraction for water than any other substance, than to imagine sodium contained in every possible substance, from the eternally-burning Sun himself, down to every particle of our atmosphere?

A man need not be a chemist, or pyrologist, to observe that, if he holds in platinum tongs a fragment of marble, or artificial carbonate of lime, or magnesia, before the blow-pipe, a strong orange flame affording "D-lines" spectra is emitted by the fragment, *only so long as it is imperfectly calcined*, or, in other words, has lost its carbonic acid gas. When calcination is complete, it begins to glow brightly, and emits no colored "flame" at all. Let us call this orange flame (a) in this case. According to modern chemical theories (a) can only be one of two things; carbonic acid gas or sodium. It cannot be carbonic acid, which so far from being combustible, is used to "put out" flame. It can be proved not to be sodium by making it impinge upon a bead of pure transparent boric acid, in which it causes, after a time, *opalescence*. This opalescence is removed by the similar impingement upon the bead of an indubitable sodium orange flame. Reasonable chemists, therefore, will not be inclined to contradict Euclid that the same cause producing precisely opposite effects is a *reductio ad absurdum*. Moreover, for the supposed sodium to have been with the marble, and not with the marble after calcination—"hic et ubique," like the ghost of Hamlet's papa—is another absurdity, which no modern chemist would require us to believe, although some are very exacting if not always exact. May I hope that most chemists will be now inclined to admit, first, that (a) can be due neither to sodium nor to carbonic acid; and secondly, that it must, therefore, be due to something else; and this is the very impression that occurred to me after thinking profoundly over the matter for several years.

Indeed, I suggested to Mr. Hennessy, who was engaged in making atmospheric observations at Mussooree, in India, with a spectroscope belonging to the Royal Society—and who was elected an F.R.S. for his pains—that the "D-lines" were due to water, not sodium, so long ago as 1871, and he was very much struck by the suggestion.

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